cally executed prehensile motions. Such a stupid manner of acting is in complete contradiction to that which is observed among animals that devote themselves to the pursuit of other animals and feed on living prey; I presume, therefore, that the Aye-Aye feeds on vegetable substances. I have often seen it, after having swallowed a certain quantity of liquid food, devour a piece of bark."

The Cheiromys, at the Botanical Garden, given by M. Humblot and M. Archambault, act exactly like the one which has been so conscientiously studied by Mr. Bartlett, the Superintendent of the Zoological Garden of London. They sleep during the whole day, which is very annoying to the visitors desirous of seeing these strange animals, and, when the keeper tries to arouse them from their sleep, they show their ill-humor by attempting to bite and by endeavoring to retreat to the most obscure corner of their cage.

In Madagascar, the Aye-Aye inhabits the large forests, and are found not only in the western region, as Sonnerat thought, but also on the southeastern side, where it has been observed by M. Grandidier. According to the natives, it builds a real nest, of a spherical form, in which the female deposits and raises her young. This assertion without doubt merits belief, since in 1877, M. Soumage brought to France one of these nests, which was built on the forked-head of two branches, and which contained a female and her young. The walls of this nest were formed of rolled leaves of the Ravenala or *Tree of the Traveler*, covering an interweaving of twigs; it has on one side a very narrow opening.

The smallest of the other Lemurs—the Chirogales, the Microcebes and the Lepilemurs—have, it appears, similar habitats, and also interweave, with twigs and leaves, a home for their progeny, while the Makis, and all the higher orders of Lemurs, build no nests, and carry their young attached to their back or hung against their breast.—*Translated from La Nature.*

DETECTION OF OLEOMARGARINE.*

By P. Casamajor.

In the *Moniteur Scientifique* for April, 1881, is an article on Butter Analysis, in which are given the processes, used at the Municipal Laboratory, attached to the Prefecture of Police in Paris, for the detection of foreign fats in butter. This is followed by an account of an areometric method, used for the same purpose and based on the difference of density between butter and the fats with low melting point, extracted from tallow, which are made to resemble genuine butter, and which are known under the commercial name of *Oleomargarine.*

The sale of Oleomargarine has become so extensive in this country, that a purchaser of butter is never sure whether he is getting true butter or its imitation. In view of this fact, I have thought it useful to give a process, based on the difference of specific gravity between butter and oleomargarine, of such simplicity that it can be easily applied by any person having rudimentary ideas of manipulation.

Processes of this character are those which can be used with greatest efficiency to check adulterations. I have, in previous communications, given such processes for the detection of Starch Sugar mixed with Cane Sugar, and for the detection of starch sugar syrup, mixed with sugar house syrups.

Although my concern is principally with the difference of density between butter and oleomargarine, I propose to very briefly call attention to the processes used at the Municipal Laboratory of the Prefecture of Police, as these show important differences in chemical composition between true butter and its adulterant, which confirm the difference in the specific gravity. Such an important character as the specific gravity would not differ to any marked extent, without a corresponding diversity in the composition of the two substances.

One process used at the Municipal Laboratory is the following: the sample of butter to be tested is melted, so as to separate water, salt etc., which are deposited, and a certain amount of scum, which comes to the surface. Of the clear melted fat, under the scum, about 3 or 4 grammes are taken and saponified by 1 or 2 grammes of potassic hydrate. The fat and potassa should be mixed with 50 C. C. of alcohol. In about 5 minutes the saponification is complete, and the cautious addition of water should not produce any turbidity. If any takes place, the operation must be begun anew. The soap formed is afterwards decomposed with weak sulphuric acid, and the insoluble fat acids are collected and weighed. The result of a great number of experiments is that in butter the percentage of fat acids thus obtained is usually 86.5 to 87.5 per cent., and that sometimes, it is as high as 88 per cent. In animal fats from tallow the percentage of insoluble fat acids is 95½. The difference 95½—87½ =8 per-cent., is attributed to the absence in tallow of volatile and soluble fat acids which exist in butter.

Another process is given in which the result is obtained volumetrically, by estimating the quantity of potassa used in saponifying the fat. One gramme of butter requires 225 to 232.4 C. C. of potassa solution, while 1 gramme of tallow, or other animal fat of the same nature, requires from 195 to 197 grammes of the same potassa solution.

Mr. Charles Girard, director of the Municipal Laboratory, considers as adulterated any butter requiring, for saponification, less than 221.5 C.C., of the potassa solution. In some unfavorable cases this volume may represent nearly 30 per cent. of foreign fat.

The method for detecting the difference between butter and oleomargarine by the difference of specific gravity, is one proposed by Messrs. Leune and Harburet.

The butter to be tested is first melted so as to separate the pure fat from water, salt, etc. The clear melted fat is placed in a cylinder, heated by the vapor escaping from a water bath, kept boiling, but no part of the cylinder is to be in the boiling water. I understand that by heating in this way, the temperature of the melted fat remains at about 93° C. To determine the density of this fat an areometer is placed in it. This areometer is graduated in such a way that, in butter, it will sink to the lowest mark of the scale, while oleomargarine corresponds to the highest point in the graduation. The intervening space is divided into ten equal parts, each one of which corresponds to $\frac{1}{10}$ of oleomargarine, mixed with butter. More than 600 experiments made by Messrs Leune and Harburet with artificial mixtures show that, within an approximation of ten per cent., the instrument gives correct results.

Soon after this areometric method was published, it was announced that the difference of the specific gravities of butter and of oleomargarine, was too slight to distinguish the one from the other. As Messrs. Leune and Harburet had not stated what the specific gravity of each was, it was impossible to judge of the truth of this statement, and it became interesting to ascertain the facts of the case. The following process is the result of my attempts to determine the specific gravities of butter and of oleomargarine. I chose in the first place to ascertain the specific gravity of each at 15° C, which is the usual temperature for such determinations. The process consisted in finding for each a liquid in which, at 15° C, a portion of butter or of oleomargarine, freed from impurities by previous melting and containing no air bubbles, would remain in equilibrium in any portion of the liquid, without any tendency to rise to the top or sink to the bottom. The readiest liquid for this purpose was a mixture of alcohol and water, as this is easily prepared and it has no dissolving action on the fats to be tested. As the density of the liquid in which a body remains in equilibrium is the density of the body itself, the problem was narrowed down

* (Read before the American Chemical Society Sept. 1881.)

to finding the difference of density between two mixtures of alcohol and water of different strengths. It was found that pure butter, at 15° C, would remain in equilibrium in alcohol of 53.7 per cent. This corresponds to specific gravity 0.926. This butter was obtained from a gentleman, at whose country place the butter was made. I obtained oleomargarine from melted warm beef suet by pressure. At a temperature of 25° C, this expressed fat had the consistency of butter. The alcohol which at 15° C, would hold it in equilibrium had a strength of 59.2 per cent., which corresponds to a specific gravity of 0.915.

The question of the possibility of distinguishing butter from oleomargarine becomes equivalent to the possibility of distinguishing alcohol of 53.7 per cent., from alcohol of 59. 2 per cent. As this difference is 5.5 degrees of Gay Lussac's alcohometer, it is very evident that the specific gravity is a sufficient character for distinguishing butter from oleomargarine. This difference may appear more clearly to persons not familiar with alcohometry by stating that it is the difference between 0.926 specific gravity and 0.915.

By means of the tables of Gay Lussac and of Tralles,* it is a very easy matter to prepare alcohol of the required strength at any temperature, to be kept in bottles for future use.

As the expansion of fats is different from that of alcohol, it is advisable to bring the alcohol to 15° C, when making an observation, which can be easily done by any one provided with a thermometer.

To deliver the sample of fat on the alcohol, I have found that the best plan is to melt the fat and let a large drop of it fall into the liquid. The fat should be melted in a little spoon or a little scoop, and the drop should be delivered by bringing the spoon or scoop close to the surface of the alcohol. It requires a little practice to do this neatly, so as not to get an air bubble in the ball of melted fat. When an air bubble becomes imprisoned in the fat, I have had no difficulty in removing it with a strip of paper, while it lies on top of the alcohol. Sometimes the globule of fat only partially sinks in the alcohol; the top of it becomes flat and remains exposed above the liquid. A slight tap on the side of the glass is then generally sufficient to form a wave and sink the globule.

If we take alcohol of 56½ per cent., which represents equal volumes of alcohol of 53.7 per cent., and of 59.2 per cent., and if we deliver on the surface of this alcohol a globule of melted butter and one of oleomargarine, the butter will sink to the bottom and the oleomargarine will remain at the top, while the two globules are still warm and liquid. Afterwards, if the alcohol has a temperature of about 30° C, the butter will become solid, while the oleomargarine may still remain liquid. Then the butter will rise to the top of the alcohol, which is due to the expansion of butter on solidifying. If the alcohol be then kept for a few minutes, at 15° C, the oleomargarine will become opaque and remain at the top while the solid globule of butter will sink to the bottom.

If instead of taking alcohol of 56 per cent. we use alcohol of 59.2 per cent., oleomargarine will remain on top and butter will sink to the bottom at all temperatures above 15° C. At 15° C., oleomargarine will remain in eqilibrium in any portion of the liquid in which it may be placed.

If oleomargarine was always sold pure, the foregoing indications would be sufficient to distinguish it from butter, but the oleomargarine found in the market is always more or less mixed with true butter to improve its taste and appearance. This being the case, alcohol of 59 per cent. is not the proper liquid to detect oleomargarine. We should use alcohol of 55 per cent. and consider as oleomargarine any so called butter which will not sink to the bottom in alcohol of this strength at 15° C. This is founded on the fact that not more than ⅓ of butter is ever mixed with oleomargarine to improve its taste and appearance.

*See the excellent tables of Prof. Mc. Culloh.

Bearing in mind the experiments of Messrs. Leune and Harburet, already cited, the proportion of butter and of oleomargarine in a mixture could be easily detected by finding what strength of alcohol will hold in equilibrium at 15° C, a globule of fat under examination. As the difference of 59.2 and 53.7 is 5. 5, the proportion of oleomargarine is the difference between the strength of the alcohol and 53.7, divided by 5.5, or more conveniently multiplied by 0.18. If the alcohol required to hold a globule of fat in equilibrium at 15° C, has a strength of 57 per cent., then: $(57-53.7)\times 0.18=3.3\times 0.18=5.95$, or say $\frac{6}{10}$ of oleomargarine. If the alcohol had a strength of 58, then $58-53.7\times 0.18=4.3\times 0.18=7.72$, or about $\frac{8}{10}$ of oleomargarine.

The proportions of butter and oleomargarine in a mixture may be also determined without the aid of an alcohometer, by using the two solutions of 53.7 per cent. and of 59.2 per cent. These may be placed in graduated glasses and poured cautiously into a third glass, until an alcohol of sufficient strength is obtained to keep in equilibrium a globule of the fat under examination at 15° C.

The relative volumes of the two solutions used in making the mixture, give the proportions of butter and oleomargarine.

The accuracy of these calculations rests entirely on the results obtained by Messrs. Leune and Harburet. I have not verified them by experiment, and I do not clearly see their utility. When we buy butter it is interesting to know whether what we buy is pure butter or not. It is no palliation to the offence of selling oleomargarine for butter that the oleomargarine contains ¼ or ⅙ of real butter.

FILARIA OF THE HUMAN BLOOD.

The members of the Pathological Society, of London, recently enjoyed the rare opportunity (in this country) of seeing the filaria sanguinis hominis in the living state from a patient in the London Hospital suffering from hæmato-chyluria, under the care of Dr. Stephen Mackenzie. They were also enabled to hear from Drs. Cobbold and Vandyke Carter the facts at present known concerning filarious disease, whilst the observations related by Dr. Mackenzie, most patiently and carefully pursued for two months upon the case in question, were a valuable addition to these facts. In one important point these observations have resulted in a further discovery, to which we shall refer again. Our present purpose will be simply to gather up briefly the facts as detailed by these speakers, and to indicate their bearings upon the pathology of the obscure affections of the lymphatic system with which they are connected. In the first place we have now—thanks to the discoveries of Bancroft, Lewis, and Manson —a complete knowledge of the life history of the parasite. Like so many similar creatures, it presents us with an example of alternation of generations; or more correctly speaking, of the need of two hosts for its full development. The minute almost structureless worms found in the blood of the human subject in such vast numbers are the *embryonic* forms of the filaria which requires the mosquito in which to develop into the sexually mature worm. The mosquito feeding on the blood at night, when the filariæ are generally alone to be found, becomes gorged with them. Their growth in the mosquito has been traced by Lewis and Manson, and it is presumed that they are only liberated from the body of their host by its death in the water to which it always finally resorts. The nematoid is thus set free, and possibly undergoes further development; for the mature worm measures some three inches in length. Its passage into the human body is easily explained; and the analogy in this respect with the larger nematoid—the guinea-worm—is one which Dr. Vandyke Carter ably illustrated. Once within the human body, the worm lodges in the tissues, but as to its migrations, and, indeed, its ultimate resting-place, but little is known. It